

1632

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
(MBHB00,716-D, 600.016)

In the Application of:

Beigelman, et al.

Serial No. 10/043,951

Filed: January 11, 2002

For: METHOD OF SYNTHESIZING NUCLEOSIDES,  
NUCLEOSIDE DERIVATIVES AND NON-  
NUCLEOSIDE DERIVATIVES



Examiner:

Art Unit: 1632

Assistant Commissioner for Patents  
Washington, D.C. 20231

RECEIVED  
MAY 06 2002  
TECH CENTER 1600/2900

Sir:

TRANSMITTAL LETTER

In regard to the above identified application:

1. We are transmitting herewith the attached papers for the above identified new patent application:

- ☒ Information Disclosure Statement;
- ☒ Information Disclosure Statement (IDS) PTO-1449 Form; and
- ☒ Return Receipt Postcard.

2. With respect to additional fees:

- ☒ No additional fee is required.

3. GENERAL AUTHORIZATION: Please charge any additional fees or credit overpayment to Deposit Account No. 13-2490. A duplicate copy of this sheet is enclosed.

4. CERTIFICATE OF MAILING UNDER 37 CFR § 1.8: The undersigned hereby certifies that this Transmittal Letter and the paper, as described in paragraph 1 hereinabove, are being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231 on APRIL 25 2002.

By: Stephen H. Docter  
Stephen H. Docter  
Registration No. 44,659

McDONNELL BOEHNEN HULBERT & BERGHOFF  
300 SOUTH WACKER DRIVE  
CHICAGO, ILLINOIS 60606  
TELEPHONE (312) 913-0001  
FACSIMILE: (312) 913-0002



#4  
5/2/02

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
(MBHB00,716-D, 600.016)

In the Application of:

Beigelman, et al.

Serial No. 10/043,951

Filed: January 11, 2002

For: METHOD OF SYNTHESIZING NUCLEOSIDES,  
NUCLEOSIDE DERIVATIVES AND NON-  
NUCLEOSIDE DERIVATIVES

Examiner:

Art Unit: 1632

Assistant Commissioner for Patents  
Washington, D.C. 20231

RECEIVED

MAY 06 2002

TECH CENTER 1600/2900

INFORMATION DISCLOSURE STATEMENT

Dear Sir:

Pursuant to the duty of disclosure provided by 37 C.F.R. §1.56 and §§1.97-98, the applicants wish to make the following references of record in the above-identified application. This application is a continuation-in-part of US Serial No. 09/944,554 filed August 31, 2001, and is relied upon for an earlier filing date under 35 U.S.C. § 120. In accordance with Rule 37 CFR §1.98(d), only copies of references not previously cited and submitted to the Patent and Trademark Office with the prior application USSN 09/944,554 are enclosed for the convenience of the Examiner (document numbers marked with "\*" are not enclosed). Copies of all references cited are also listed in the PTO-1449 form enclosed herewith. It is requested that each document cited (including any cited in applicant's specification which is not repeated on the attached Form PTO-1449) be given thorough consideration and that it be cited of record in the prosecution history of the present application by initialing on Form PTO-1449. Such initialing is requested even if the Examiner does not consider a cited document to be sufficiently pertinent to use in a rejection, or otherwise does not consider it to be prior art for any reason, or even if the Examiner does not believe that the guidelines for citation have been fully complied with. This is requested so that each document becomes listed on the face of the patent issuing on the present application.

Portions of the references may be material to the examination of the pending claims, however no such admission is intended. 37 C.F.R. §1.97 (h). The references have not been reviewed in sufficient detail to make any other representation and, in particular, no representation is intended as to the relative importance of any portion of the references. This Statement is not a representation that the cited references have effective dates early enough to be "prior art" within the meaning of 35 U.S.C. §§102 or 103.

### **CITED REFERENCES**

#### **U.S. PATENT APPLICATION DOCUMENTS**

*	09/406,643	9/27/99	Ludwig et al.
---	------------	---------	---------------

#### **U.S. PATENT DOCUMENTS**

*	4,987,071	01/22/91	Cech et al.
*	5,631,360	05/20/97	Usman et al.
*	5,849,902	12/15/98	Arrow et al.
*	5,891,683	04/06/99	Usman et al.
*	5,962,675	10/05/99	Beiglelman et al.
*	5,998,203	12/07/99	Matulic-Adamic et al.

#### **FOREIGN PATENT DOCUMENTS**

*	6067492		Japanese (Furusawa)
*	10226697		Japanese (Furusawa)
*	WO 99/55857	11/04/99	WO (Beigelman et al.)
*	WO 99/16871	04/08/99	WO (Eckstein et al.)
*	WO 98/28317	07/02/98	WO (Karpiesky et al.)
*	WO 98/58057	12/23/98	WO (Ludwig et al.)
*	WO 98/58058	12/23/98	WO (Ludwig et al.)

**OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc).**

- \* Agrawal, "Antisense oligonucleotides: towards clinical trials," *Trends Biotech.*, 14, 376-387 (1996)
- \* Beaucage and Iyer, "Advances in the Synthesis of Oligonucleotides by the Phosphoramidite Approach," *Tetrahedron*, 48, 2223-2311 (1992)
- \* Beaudry et al., "In vitro selection of a novel nuclease-resistant RNA phosphodiesterase," *Chemistry and Biology*, 7, 323-334 (2000)
- \* Beigelman et al., "Synthesis of 2'-modified nucleotides and their incorporation into hammerhead ribozymes," *Nucleic Acids Research* 23(21):4434-4442 (1995)
- \* Bhat, V. et al., "A simple and Convenient Method for the Selective N-Acylations of Cytosine Nucleosides," *Nucleosides & Nucleotide*, 8(2), 179-83 (1989)
- \* Burgin et al., "Chemically Modified Hammerhead Ribozymes with Improved Catalytic Rates," *Biochemistry* 35:14090-14097 (1996)
- \* Cech, "Ribozymes and Their Medical Implications," *JAMA* 260:3030-3034 (1988)
- \* Chaix et al., "Solid phase synthesis of the 5'half of the initiator 1-RNA from *B. subtilis*," *Nucleic Acids Research*, 17, 7381-7393 (1992)
- \* Christoffersen and Marr, "Ribozymes as Human Therapeutic Agents," *J. Med. Chem.* 38:2023-2037 (1995)
- \* Cook et al., "Characterization of HIV-1 REV protein: binding stoichiometry and minimal RNA substrate," *Nucleic Acids Research*, 19, 1577-1583 (1991)
- \* Crooke, "Advances in Understanding the Pharmacological Properties of Antisense Oligonucleotides," *Advances in Pharmacology* 40:1-49 (1997)
- \* Crooke, "Antisense Therapeutics," *Biotechnology and Genetic Engineering Reviews* 15:121-157 (1998)
- \* Delihias et al., "Natural antisense RNA/target RNA interactions: Possible models for antisense oligonucleotide drug design," *Nature Biotechnology* 15:751-753 (1997)
- \* Duval-Valentin, "Specific inhibition of transcription by triple helix-forming oligonucleotides," *Proc. Natl. Acad. Sci. USA* 89:504-508 (1992)
- \* Egholm et al., "PNA hybridizes to complementary oligonucleotides obeying the Watson-Crick hydrogen-bonding rules," *Nature* 365:566-568 (1993)
- \* Francklyn and Schimmel, "Aminoacylation of RNA minihelices with alanine," *Nature*, 337, 478-481 (1989)
- \* Gait et al., "Ch. 2 - Oligoribonucleotide synthesis," in *Oligonucleotides and Analogues: A Practical Approach*, edited by Eckstein, IRL Press, Oxford, pp. 25-48 (1991)
- \* Gold, "Posttranscriptional Regulatory Mechanisms in *Escherichia Coli*," *Annu. Rev. Biochemistry*, 57, 199-233 (1988)
- \* Hobbs and Eckstein, "A General Method for the Synthesis of 2'-Azido-2'-deoxy- and 2'-Amino-2'-deoxyribofuranosyl Purines," *J. Org. Chem.* 42:714-719 (1977)
- \* Ikehara and Maruyama, "The Total Synthesis of an Antibiotic 2'-Amino-2'-deoxyguanosine," *Chem. Pharm. Bull.*, 26, 240-244 (1978)

- \* Ikehara et al., "Synthesis of Purine Nucleosides having 2'-Azido and 2'-Amino Functions by Cleavage of Purine Cyclonucleosides," *Chem. Pharm. Bull.*, 25, 754-760 (1977)
- \* Imazawa and Eckstein, "Facile Synthesis of 2'-Amino-2'-deoxyribofuranosyl Purines," *J. Org. Chem.* 44:2039-2041 (1979)
- \* Johnson and Benkovic, "Analysis of Protein Function by Mutagenesis," *The Enzymes*, Vol. 19, 159-211 (1990)
- \* Karaoglu and Thurlow, "A chemical interference study on the interaction of ribosomal protein L1 from *Escherichia coli* with RNA molecules containing its binding site from 23S rRNA," *Nucleic Acids Research*, 19, 5293-5300 (1991)
- \* McGee et al., "2'-Amino-2'-deoxyuridine via an Interamolecular Cyclization of a Trichloroacetimidate," *J. Org. Chem.*, 61, 781-785 (1996)
- \* Nefkins et al., "A Simple Preparation of Phthaloyl Amino Acids Via a Mild Phthaloylation," *Recl. Trav. Chim. Pays-Bas.*, 79, 688-698 (1960)
- \* Robins et al., "Nucleic Acid Related Compounds. 71. Efficient General Synthesis of Purine (Amino, Azido, and Triflate)-Sugar Nucleosides," *Nucleosides and Nucleotides* 11:821-834 (1992)
- \* Schmajuk et al., "Antisense Oligonucleotides with Different Backbones," *The Journal of Biological Chemistry* 274:21783-21789 (1999)
- \* Sproat et al., "An Efficient Method for the Isolation and Purification of Oligoribonucleotides," *Nucleosides & Nucleotides* 14:255-273 (1995)
- \* Stein and Cheng, "Antisense Oligonucleotides as Therapeutic Agents - Is the Bullet Really Magical?" *Science* 261:1004-1288 (1993)
- \* Stein et al., "A Specificity Comparison of Four Antisense Types: Morpholino, 2'-O-Methyl RNA, DNA, and Phosphorothioate DNA," *Antisense & Nucleic Acid Drug Development* 7:151-157 (1997)
- \* Sullenger et al., "Overexpression of TAR Sequences Renders Cells Resistant to Human Immunodeficiency Virus Replication," *Cell* 63:601-608 (1990)
- \* Torrence et al., "Targeting RNA for degradation with a (2'-5') oligoadenylate-antisense chimera," *Proc. Natl. Acad. Sci. USA* 90:1300-1304 (1993)
- \* Tsai et al., "In vitro selection of an RNA epitope immunologically cross-reactive with a peptide," *Proc. Natl. Acad. Sci. USA* 89:8864-8868 (1992)
- \* Usman et al., "Automated Chemical Synthesis of Long Oligoribonucleotides Using 2'-O-Silylated Ribonucleoside 3'-O-Phosphoramidites on a Controlled-Pore Glass Support: Synthesis of a 43-Nucleotide Sequence Similar to the 3'-Half Molecule of an *Escherichia coli* Formylmethionine tRNA," *J. Am. Chem. Soc.* 109:7845-7854 (1987)
- \* Usman et al., "Hammerhead ribozyme engineering," *Current Opinion in Structural Biology* 1:527-533(1996)
- \* Usman and Stinchcomb, "Design, Synthesis and Function of Therapeutic Hammerhead Ribozymes," *Nucleic Acids and Molecular Biology* 10:243-264 (1996)
- \* Usman and Cedergren, "Exploiting the chemical synthesis of RNA," *TIBS* 17:334-339 (1992)

- \* Usman et al., "Chemical modification of hammerhead ribozymes: activity and nuclease resistance," Nucleic Acids Symposium Series 31:163-164 (1994)
- \* Vargeese et al., "Efficient activation of nucleoside phosphoramidites with 4,5-dicyanoimidazole during oligonucleotide synthesis," Nucleic Acids Research, 26, 1046-1050 (1998)
- \* Verheyden et al., "Synthesis of Some Pyrimidine 2'-Amino-2'-deoxynucleosides," J. Org. Chem. 36:250-254 (1971)
- \* Wincott et al., "Synthesis, deprotection, analysis and purification of RNA and ribozymes," Nucleic Acids Research 23(14):2677-2684 (1995)

In accordance with MPEP Sections 609 and 707.05(b), it is requested the document cited (including any cited in applicant's specification which is not repeated on the attached Form PTO-1449) be given thorough consideration and that it be cited of record in the prosecution history of the present application by initialing on Form PTO-1449. Such initialing is requested even if the Examiner does not consider a cited document to be sufficiently pertinent to use in a rejection, or otherwise does not consider it to be prior art for any reason, or even if the Examiner does not believe that the guidelines for citation have been fully complied with. This is requested so that each document becomes listed on the face of the patent issuing on the present application.

Respectfully submitted,

**McDonnell Boennen Hulbert & Berghoff**

Date: *April 25, 2002*

By:

*Stephen H. Docter*  
**Stephen H. Docter**  
**Registration No. 44,659**

McDONNELL BOEHNEN HULBERT & BERGHOFF  
 300 SOUTH WACKER DRIVE  
 CHICAGO, ILLINOIS 60606  
 TELEPHONE (312) 913-0001  
 FACSIMILE: (312) 913-0002